instruction manual

"T" NOBATRONS

Sorensen & Company, inc.

Richards Avenue

South Norwalk, Conn.

"T" NOBATRONS

INSTRUCTION MANUAL

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SORENSEN & COMPANY, INC., Richards Avenue, South Norwalk Connecticut

14-1879D
10/57

I. GENERAL INFORMATION

Please read this manual. We think it will help you to obtain the maximum performance from your new Sorensen instrument.

SHIPPING DAMAGE

Sometimes instruments are damaged in transit. We strongly suggest that you inspect and test your instrument as soon as you receive it. If the instrument is damaged or if it fails to operate properly, you should ask the carrier to inspect the shipment. The carrier's claim agent will prepare a report of damage which you should send to us. We will then tell you how to have the instrument repaired or replaced.

SERVICE INFORMATION

If you have any question about the operation, repair, or servicing of a Sorensen instrument, please contact our local representatives. (A list of representatives appears in the Condensed Catalog at the rear of this manual.) If it is more convenient you may contact us directly at the Service Department, Sorensen & Co., Inc., South Norwalk, Conn.

IMPORTANT

BE SURE TO INCLUDE THE MODEL & SERIAL NUMBER IN ALL CORRESPONDENCE CONCERNING THIS INSTRUMENT. WITHOUT THIS INFORMATION, WE MAY NOT BE ABLE TO GIVE YOU PROMPT AND ACCURATE SERVICE.

RETURNS TO THE FACTORY

Should you decide to return an instrument to us for repair, please contact us for authorization to make shipment. We have a number of local service facilities in the United States and Canada which are equipped and staffed to provide you with fast, efficient service. For this reason, we reserve the right to refuse unauthorized shipments to our plant.

WARRANTY

This instrument is warranted by Sorensen & Company, Inc., to be free from defects in material and workmanship. Our obligation under the warranty is limited to servicing the instrument and replacing defective parts when the instrument is returned to the factory with transportation charges prepaid. No other warranties may be implied. The period of warranty is one year after the date of delivery of the instrument to the original purchaser. Defects caused by improper operating conditions, accidents, misuse, negligence, and the alteration or removal of the nameplate will void the warranty.

II. SPECIFICATIONS

The "T" Nobatron is a tubeless, variable voltage, DC power supply, possessing excellent line voltage regulation and transient response for line and load pulses. "T" Nobatrons may be supplied as self-contained units, or for rack mounting. Also two Model T50-1.5 units may be arranged side by side as a self contained instrument or a 19" rack.

MODEL		T50-1.5	T60-5	T120-2.5
Input Voltage, A. C.		95-130V, 1 phase, 60 cycles		
Input Current, Max.		1.75 amps	6.0 amps	
Output Voltage, D. C.				
3 Ranges	1.	0-10V	0-10V	0-20V
	2.	0-25V	0-25V	0-50V
	3.	0-50V	0-60V	0-120V
Output Current, Max.		1.5 amps	5.0 amps	2.5 amps
Output Regulation, Line				
105-125VAC Input		± 1%	± 0.5%	± 0.5%
95-130VAC Input		± 2%	± 1%	± 1%
Internal Resistance				
Max. Ohms.	Range 1.	1.5 ohms	0.35 ohms	1.3 ohms
	Range 2.	3.0 ohms	0.55 ohms	2.0 ohms
	Range 3.	6.0 ohms	1.00 ohms	4.0 ohms
Ripple, Max.		50 millivolts, maximum		
Ambient Temperature Range		15°C-40°C		
Dimensions	Rack	8-3/4" panel	10-1/2" panel	
	Cabinet	10-3/4" W. 9-1/4" H. 12" D.	19-3/4" W. 10-7/8" H. 14-7/8" D.	
Weight		38 lbs.	98 lbs.	93 lbs.
Input Terminals		Line Cord, rear		
Output Terminals		Binding Posts, front panel		
On-Off Switch		Combined with Range Switch	Combined with Over-current Breaker	
Output Overcurrent Protection		Fuse, 1.5 Amp	Magnetic Circuit Breaker	
Input Fuse		1.5 amp, panel	5 amp, rear	
Meters		Voltmeter Standard	Voltmeter & Ammeter, Standard	

III. INSTALLATION AND OPERATION

TERMINALS & CONTROLS

1. Input Connection

The input power is applied by means of a line cord utilizing a three prong plug. Since the third prong of this plug is connected to the chassis, connection of the line cord to the appropriate receptacle automatically grounds the equipment. If the user does not have three prong outlets available, he should use an adapter. The user should make sure that the extra wire (coded green) coming out from the adapter is solidly grounded to the power line wiring system, preferably soldered. The aforementioned should be carried out for safety reasons.

2. Output Connection

The DC output is available at the two binding posts located on the front panel. The input is isolated from the output, and the entire circuitry is isolated from the chassis ground. This DC output is "floating" and hence may be grounded at either the plus or minus terminal.

CAUTION: In no instance should the output be connected to an external potential of over 250 volts to ground. Over 250 volts may cause a breakdown of the instrument's components.

3. On-Off AC Power Switch

The On-Off switch is either combined with the output voltage range switch or an overcurrent breaker.

4. Output Range Switch

The output range switch located on the front panel determines the selected output range and the corresponding voltmeter range. On some models it is combined with the On-Off Switch

5. Pilot Lamp

A pilot lamp is provided on the front panel to indicate when the AC power is applied. The pilot lamp remains lit even though F1; fuse is blown.

6. DC Voltmeter and Ammeter

A DC voltmeter is provided on the front panel to indicate output voltage. The voltmeter multipliers automatically change with the range switch. The voltmeter will not read if F2 is blown.

On some models (refer to specs.) a DC ammeter is provided for reading output current.

7. DC Voltage Control Knob

A DC voltage control knob which is provided on the front panel actuates a variable auto-transformer. This transformer gives full output voltage adjustment from zero to the rated DC output of the range selected.

FUSES & PROTECTIVE DEVICES

1. The AC Protective Fuse protects the internal variable auto transformer (voltage control) and other components from injury due to internal short circuits, etc. This fuse should normally never need replacing.

2. The DC output overcurrent protection is directly connected in the DC output circuit to protect the instrument against external overload or short circuits. This device is either a fuse or an overcurrent breaker (see specs.) The DC voltmeter will not read if this device has opened due to overload. The circuit breaker must be reset manually after overload.

CAUTION: Always replace the fuses with an exactly rated duplicate. An oversize fuse may cause breakdown of components, especially in germanium rectifiers.

OPERATION

CAUTION: BEFORE OPERATION IS BEGUN, PLEASE REVIEW THE PRECEDING SECTION WITH REGARD TO CONTROLS.

1. Plug the input line cord into a 115V, 60 cycle outlet. See A-1 above .

2. Set the DC Output Range Switch to the desired output range.

CAUTION: In order to prevent damage to the voltmeter or range switch, always turn the DC Output Control Knob to zero voltage or turn the power off before operating the DC Range Switch.

3. Turn on the AC power (on-off) switch. Note that the pilot light will now be lit and the voltmeter will simultaneously correspond to the selected range.

4. Adjust the output adjustment knob to obtain the exact voltage desired within the range selected.

NOTE: It is always desirable to select the lowest voltage range possible, for this permits smoothest control, maximum voltmeter deflection, and the lowest internal impedance. The lower the internal impedance, the better the regulation (against load variation).

IV. PRINCIPLE OF OPERATION

The "T" Nobatron DC power supplies are designed to eliminate line voltage variations from affecting the DC output voltage by means of a constant voltage transformer connected prior to the rectifiers. Unlike conventional regulator principles, these instruments do not eliminate load current variations from affecting the DC output voltage, but by using low impedance rectifiers, impedance of the DC section is minimized. Rectification is accomplished by means of germanium rectifiers, and the resultant DC voltage is selected and controlled by the variable transformer and range switch.

A. AC Regulating Circuit

The AC Regulating Circuit consists of the line voltage saturable transformer T1, linear reactor L1, and resonant capacitors. This circuit, which has a fast response (one to three cycle) delivers a regulated AC voltage to the variable auto-transformer T2.

B. Voltage Varying Circuit

The variable auto-transformer, T2, selectively controls the AC voltage applied to the step-down transformer T3. Note that this transformer has a tapped secondary in order to permit full dial rotation of T2, on all three output voltage ranges. This tapped secondary, in addition, minimizes the impedance on the lower voltage range.

C. DC Circuit

The Range switch, SW1, selects the range desired and applies the voltage to the rectifier S1. This rectifier is a low impedance germanium rectifier. Choke L2, together with Capacitors, serve to filter the DC voltage.

V. MAINTENANCE AND REPAIR

MAINTENANCE

During normal life this instrument requires no maintenance other than the care afforded similar equipment. It is suggested that excessive dust, etc., be removed periodically exercising care to prevent damage by cleaning tools or excessively strong air blasts.

SPARE PARTS

All components used in these instruments are of a good commercial grade and can be expected to give a reasonably long period of trouble free service. As the age of the instrument increases, some components are likely to deteriorate. We suggest that you note those items asterisked on the Parts List, which we recommend be kept on hand.

In the event it becomes necessary to replace any part, we strongly suggest that the replacement parts be of the same value as the original. Substitute parts should not be used unless we assure you that the substitute part will not impair the performance of the instrument.

REPAIR

CAUTION: DANGEROUS VOLTAGES EXIST IN THIS INSTRUMENT. PLEASE OBSERVE APPROPRIATE PRECAUTIONS.

Trouble Shooting Chart

Symptom	Cause	Procedure for Repair
No Output Voltage	Fuses blown Circuit Breaker trip Open Circuit Defective Rectifier S1	Replace fuse/reset breaker Test for continuity Check for normal AC voltage on T3 secondary. If this is present, replace rectifier S1.
Low Output Voltage (with voltage control full on)	Defective voltage regulating transformer	Check for normal AC voltage across T2. If this is not present, check T1, C1, and L1 for defect.
	Defective variable auto transformer or step down transformer	Check for normal AC voltage on these transformers Replace defect.
	Defective rectifier S1	Check for normal AC voltage on T3 secondary. If this is present, replace rectifier.

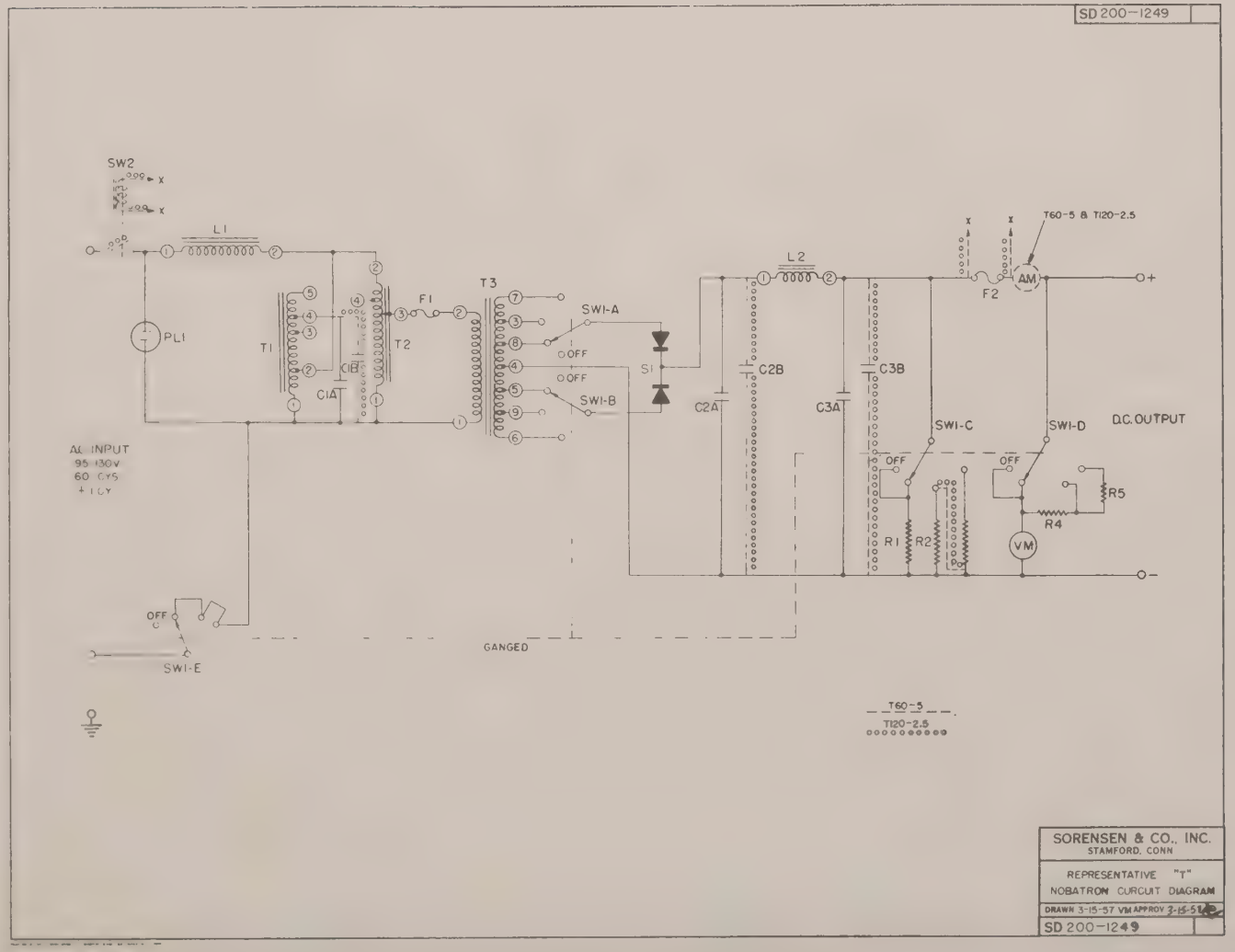
Trouble Shooting Chart (Cont'd.)

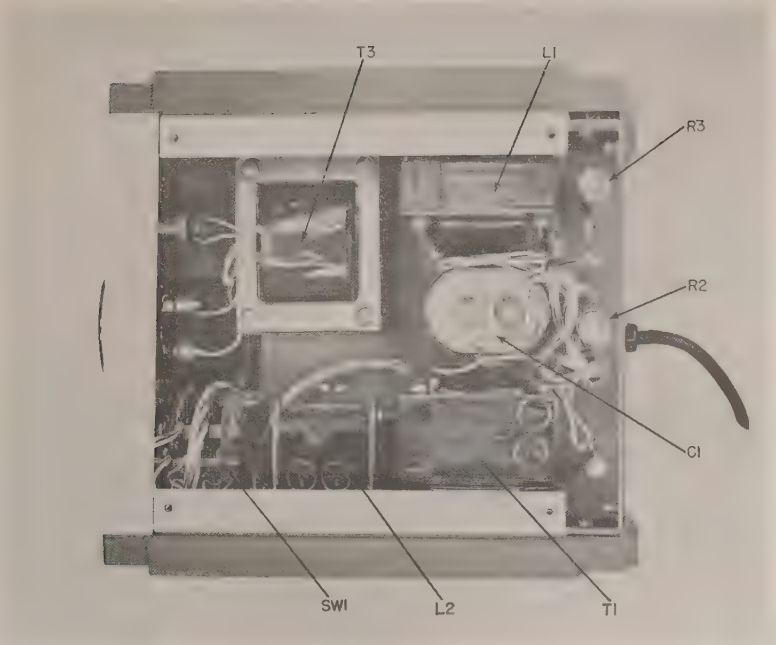
Symptom	Cause	Procedure for Repair
Poor Regulation or Reduction in Regulating Range	Defective Voltage Regulating Transformer	Check for normal AC voltage across T2. If this is not present, ;check T1, L1, and C1, and replace defective component.
High Ripple	Defective Capacitor C2	Check ripple across C2. Should be less than 1VAC.
	Defective DC Choke or Capacitor C3	Replace C3. If still high ripple, replace L2.

Typical Voltage Measurements

Typical circuit voltages are shown below. All voltage measurements should be taken with a 1000 ohm per volt meter. Checks should be made at 115VAC input, maximum output voltage and current.

Component	T50-1.5		T60-5		T120-2.5	
	Term.	Volts(AC)	Term.	Volts(AC)	Term.	Volts (AC)
T1	1&2	111	1&2	111	1&2	111
	3&4	620	1&4	668	1&4	670
L1	1&2	87	1&3	95	1&3	85
T2	1&2	111	2&4	112	2&4	112
	1&3	100	2&3	101	2&3	101
T3	1&2	100	1&2	101	1&2	101
	7&4	47	3&4	55	3&4	110
	6&4	47	6&4	55	6&4	110
	3&4	26	7&4	24	7&4	48
	9&4	26	9&4	24	9&4	48
	8&4	12	8&4	12	8&4	24
	5&4	12	5&4	12	5&4	24
L2	1&2	0.5VDC	1&2	0.25VDC	1&2	0.58VDC
SW1	-	-	1&2	0.45VDC	1&2	0.75VDC

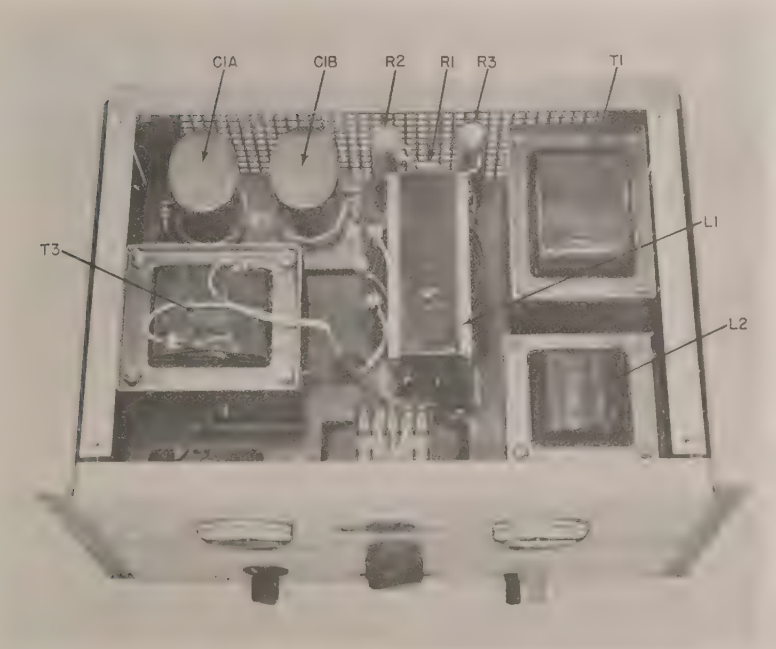

SD 200-1249
SW2
L1
PL1
T1
T2
C1B
C1A
F1
T3
SW1-A
OFF
OFF
SW1-B
S1
C2A
C2B
L2
C3A
C3B
T60-5 & T120-2.5
F2
AM
+
SW1-C
SW1-D
D.C. OUTPUT
OFF
OFF
R1
R2
R4
R5
VM
-
A.C. INPUT
95-130V
60 CYS
± 1 CY
OFF
SW1-E
GANGED
T60-5
T120-2.5
SORENSEN & CO., INC.
STAMFORD, CONN
REPRESENTATIVE "T"
NOBATRON CURCUIT DIAGRAM
DRAWN 3-15-57 VM APPROV 3-15-57
SD 200-1249



Model T50-1.5 at Serial T256

CHASSIS LAYOUTS (TOP VIEWS)

Model T60-5 at Serial TA 9 *



* The Model T120-2.5 is similar in appearance

REPLACEMENT PARTS LISTS

Listed below are the Replacement Parts for these instruments. Those items which we recommend be kept on hand as the age of the instrument increases are indicated by an asterisk.

MODEL T50-1.5

Schematic Symbol	Description	Sorensen Part No.	Specifications
R1	Resistor, 50 ohm, 10W	27-556	Ward Leonard 10F50
R2	Resistor, 100 ohm, 25W	27-741	Ward Leonard 25F100
R3	Resistor, 250 ohm, 25W	27-740	Ward Leonard 25F250
R4	Resistor, 15K ohm, 1/2W	27-985	Aerovox CP 1/2
R5	Resistor, 30K ohm, 1/2W	27-986	Aerovox CP 1/2
*C1	Capacitor, 2 mfd. 660VAC	24-368	Cornell Dubilier KD6020-2
*C2, 3	Capacitor, 2500 mfd, 80VDC	24-449	Sorensen Spec 14-1620
T1	Saturable Reactor Trans.	126-1627	Sorensen & Co.
T2	Variable Auto Trans.	91-953	Superior #B10
T3	Rectifier Input Trans.	126-1628	Sorensen & Co.
L1	Linear Reactor	127-1239	Sorensen & Co.
L2	D. C. Choke	127-1240	Sorensen & Co.
*S1	Rectifier	26-961	Gen. Elec. 4JA211CCIACI
*F1	Fuse, 1.5 amp, 3AG	42-407	Littlefuse 31201.5
*F2	Fuse, 1.5 amp, 3AG	42-407	Littlefuse 31201.5
*PL1	Pilot Lamp, 6-8V	42-301	Gen. Elec. NE51
SW1	Switch, 6 Circuit, 3 Pos.	45-215	Sorensen Spec. 45-215
VM	Voltmeter, 0-15/30/60VDC	94-261	Marion MM2

MODEL T60-5

Schematic Symbol	Description	Sorensen Part No.	Specifications
R1	Resistor, 15 ohm, 25W	27-744	Ward Leonard 25F15
R2, 3	Resistor, 40 ohm, 50W	27-880	Ward Leonard 50F40
R4	Resistor, 15K ohm, 1/2W	27-985	Aerovox CP 1/2
R5	Resistor, 30K ohm, 1/2W	27-986	Aerovox CP 1/2
*C1 (A&B)	Capacitor, 4 mfd. 660VAC	24-380	Sorensen Spec. 14-1514
*C2, 3 (A&B)	Capacitor, 4000 mfd. 80VAC	24-472	Sangamo DCM per 24-472

REPLACEMENT PARTS LISTS

MODEL T60-5 (Cont'd.)

Schematic Symbol	Description	Sorensen Part No.	Specifications
T1	Saturable Transformer	126-1636	Sorensen & Co.
T2	Variac	91-869	General Radio Type W5
T3	Rectifier Input Trans.	126-1634	Sorensen & Co.
L1	Linear Reactor	127-1244	Sorensen & Co.
L2	D. C. Choke	127-1256	Sorensen & Co.
*S1	Rectifier	26-957	Gen. Elec. 4JA3011BH1AC1
*PL1	Pilot Lamp	42-301	Gen. Elec. NE51
*F1	Fuse, 5 amp, 3AG	42-413	Littlefuse 312005
SW1	Switch, Rotary	45-221	Mallory 1323L
SW2	Circuit Breaker	92-260	Heinemann 8131KT
AM	Ammeter, 0-300 MADC	94-154	Marion MM2
VM	Voltmeter, 0-15/30/60VDC	94-261	Marion MM2

MODEL T120-2.5

Schematic Symbol	Description	Sorensen Part No.	Specifications
R1	Resistor, 80 ohm, 25W	27-745	Ward Leonard 25F80
R2, 3	Resistor, 160 ohm, 50W	27-885	Ward Leonard 50F160
R4	Resistor, 30 ohm, 1/2W	27-986	Aerovox Type CP 1/2
R5	Resistor, 90 ohm, 1/2W	27-515	Aerovox Type CP 1/2
*C1(A&B)	Capacitor, 4 mfd. 660VAC	24-380	Sorensen Spec. 14-1514
*C2, 3(A&B)	Capacitor, 2000 mfd. 80VAC	24-474	Sangamo DCM per 24-474
T1	Saturable Transformer	126-1636	Sorensen & Co.
T2	Variac	91-869	General Radio Type W5
T3	Rectifier Input Trans.	126-1675	Sorensen & Co.
L1	Linear Reactor	127-1244	Sorensen & Co.
L2	D. C. Choke	127-1287	Sorensen & Co.
*S1	Rectifier	26-087	Gen. Elec. 4JA211CC2AC2
*PL1	Pilot Lamp	42-301	Gen. Elec. NE51
*F1	Fuse, 5 amp, 3AG	42-413	Littlefuse 312005
SW1	Switch, Rotary	45-221	Mallory 1323L

Schematic Symbol	Description	Sorensen Part No.	Specifications
SW2	Circuit Breaker	92-261	Heinemann 8131KT
AM	Ammeter, 0-3 amp D. C.	94-162	Marion MM2
VM	Voltmeter, 0-30/60/150VDC	94-263	Marion MM2

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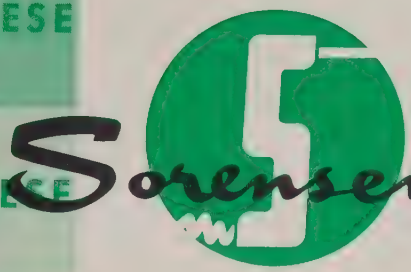


AC

ELECTRONIC REGULATORS

MAGNETIC VOLTAGE REGULATORS

400 CYCLE REGULATORS

TUBELESS REGULATORS

FREQUENCY CHANGERS

VOLTAGE REFERENCE SOURCES

DC

LOW VOLTAGE HIGH CURRENT

HIGH VOLTAGE LOW CURRENT

WIDE RANGE, ADJUSTABLE OUTPUT

TUBELESS REGULATED SOURCES

TRANSISTOR POWER SUPPLIES

400 CYCLE POWER SUPPLIES

CONDENSED STANDARD SPECIFICATIONS

SORENSEN & COMPANY, INC., • SOUTH NORWALK • CONN.

Model E-6-15A

NOBATRONS (Reg. U.S. Pat. Off.)

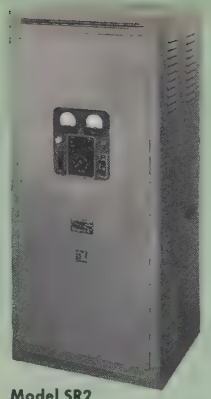
(low-voltage, high-current, regulated DC sources).

Closely regulated, efficient and stable DC supplies ideally suited for laboratory and industrial applications.

Models available (numbers indicate voltage & current) E-6-15A, E-6-40A, E-6-100A, E-12-5, E-12-15, E-12-50A, E-12-75, E-28-5, E-28-10, E-28-30, E-28-70, E-28-150, E-48-15, E-125-10, E-200-5.

ELECTRICAL CHARACTERISTICS

Input	95-130 VAC, 1ϕ, 50-60 cycles. 190-260 VAC, 1ϕ, for E-28-70. 120/208, 3ϕ, 4-wire wye for E-28-150.
Reg. accuracy	$\pm$0.2% against line (105-125 volts or 200-240 volts). $\pm$0.2% against load (1/10 to full)
Ripple	1% max. at 60 cycles (0.1% with Filter Sections available for units up to 50 amps.)
Output voltage adjustment range	6 volt units, 5.4 to 7.7 volts. E-12-50A, 9.0 to 17.6 volts. E-12-75, 10.0 to 15.5 volts. E-200-5, $\pm$50%. all others +10%, —20%
Recovery time	0.2 seconds on all models but E-28-70 (0.25 sec.) and E-28-150 (0.3 sec.)



Model SR2

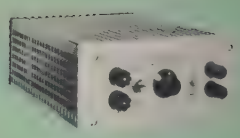
NOBATRON-RANGERS

(wide-range-variable regulated DC sources).

These versatile and popular instruments have electrical characteristics similar to the standard Nobatrons, except that output voltage is continuously adjustable.

ELECTRICAL CHARACTERISTICS

Input	95-130 VAC, 1ϕ, 50-60 cycles for SR30 and SR100. 190-260 VAC, 1ϕ, 50-60 cycles for the SR2.		
Reg. accuracy	$\pm$0.25% at any voltage setting		
Ripple	1% RMS max.		
Output: Model	SR100	SR30	SR2
VDC	5-135	5-30	100-300
Amps	1-10	3-30	1-10



Model Q6-2

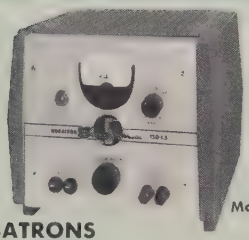
ALL-TRANSISTOR DC SUPPLY

Newest development in light, compact low-voltage power supplies. Completely transistorized, the Q6-2 is a well-regulated DC supply with excellent ripple and transient response characteristics. Two units may be racked side-by-side in standard 19" rack.

ELECTRICAL CHARACTERISTICS

Input	105-125 VAC, 50-60 cps
Output	6 VDC, adjustable $\pm$10%* 0-2 amperes
Regulation	$\pm$0.25% for any combination of line and load changes
Ripple	0.02% max.
Time constant	100 microseconds max.

*$\pm$20% adjustment possible at half load.



Model T50-1.5

T-NOBATRONS

Variable voltage, low cost tubeless supplies especially designed for transistor circuit work. Excellent line voltage regulation and transient response for line and load pulses. For normal line voltage surges, the DC output voltage will remain within regulation limits.

ELECTRICAL CHARACTERISTICS

Model	T50-1.5	T60-5	T120-2.5
AC Input (60 ~ , 1ϕ)	95-130	95-130	95-130
DC Output Voltage (three ranges)	0-10 0-25 0-50	0-10 0-25 0-60	0-25 0-50 0-120
Output Current (amps.)	0-1.5	0-5	0-2.5
Regulation, line: 105-125 V	$\pm$1%	$\pm$0.5%	$\pm$0.5%
for wider input	$\pm$2%	$\pm$1.0%	$\pm$1%
Internal Resistance, typical (ohms)			
low-voltage range	1.2	.35	1.3
middle range	2.1	.55	2.0
high range	4.5	1.0	4.0
Ripple (mv)	50 max.	50 max.	50 max.
Time Constant (line)	0.08 sec.	0.08 sec.	0.08 sec.
(load)	0.15 sec.	0.15 sec.	0.15 sec.

400-CYCLE INPUT NOBATRONS

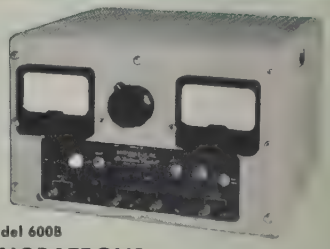
These instruments are not normal production items but are available on an extended delivery schedule.

ELECTRICAL CHARACTERISTICS

Output voltage and load range	Model DE-6-40 — 6 VDC at 4 to 40 amperes. Model DE-12-10 — 12 VDC at 1 to 10 amperes. Model DE-28-10 — 28 VDC at 1 to 10 amperes.
Input voltage	105-125 VAC, 1ϕ, 360-440 cycles.
Reg. accuracy	$\pm$0.25%.
Ripple	1% RMS maximum.
Recovery time	0.2 seconds.

FILTER SECTIONS FOR 50 & 60 CYCLE NOBATRONS

The ripple voltage of all Nobatrons is 1% of the nominal output voltage setting, under worst conditions. This is adequate for most applications. If, however, less ripple is required, Filter Sections are available for use with units rated up to 50 amperes, which will reduce the ripple to 0.1%.



Model 600B

B-NOBATRONS

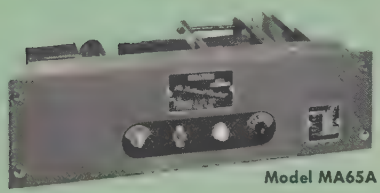
(high-voltage, low-current, regulated DC supplies).

Designed to meet the broadest technical and economical requirements. Conservatively rated, and requiring minimum service, these wide-range B-Supplies feature exceptional adaptability and rugged construction. The internal impedance figures given are from measurements in accordance with IRE specifications for measurement of power supply internal impedance.

ELECTRICAL CHARACTERISTICS

Model	300 B	325 BB	560 BB	500 BB	600 B	1000 BB
Output (VDC)	0-300	0-325	0-560	0-500	0-600	200-1000
Output (Ma)	0-150	0-125	0-200	0-300	0-500	0-500
Regulation	*0.25%	*0.5%	*0.5%	*0.5%	*0.25%	*0.5%
Ripple (MV-RMS)	5 max	5 max	5 max.	5 max	3 max	20 ma
Bias supply (VDC at 0-5 Ma)	none	0-150	0-150	0-150	0-150	none
Int. impedance (max.)	2.0 ohms	2.0 ohms	2.0 ohms	2.0 ohms	2.0 ohms	2.0 ohms
AC input range (50-60 ~, 1ϕ)	105-125	105-125	105-125	105-125	105-125	105-125
AC voltage (+2.5%, C.T., unreg.)	6.3 at 5 amp*	6.3 at 10 amp	6.3 at 10 amp	6.3 at 10 amp	6.3 at 15 amp	
Max. bias circuit impedance		25000 ohms	25000 ohms	25000 ohms	50000 ohms	

*Two outputs, Series or Parallel



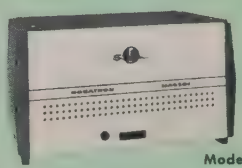
Model MA65A

TUBELESS REGULATED DC SOURCES

Designed for industrial applications and unattended installations, these regulated supplies utilize magnetic amplifiers and provide the utmost in long life and reliable maintenance-free service.

ELECTRICAL CHARACTERISTICS

Model	MA65A	MA640	MA1220	MA2850
Input (VAC, 60~)	105-125, 1ϕ	105-125, 1ϕ	105-125, 1ϕ	190-230, or 210-250, 3ϕ 4 wire, wye
Output (VDC)	5.4-6.6, adj.	4.5-7.7, adj.	11-15 or 12-16, adj.	23-32, adj.
Load Range	0-5 amp.	0-40 amp.	0-20 amp.	0-50 amp.
Reg. accuracy	$\pm$0.2% for line or load	$\pm$1.0% for any combination of line and load		
Ripple	1% max.	1% max.	1% max.	3% max.
Recovery Time	0.15 sec.	0.20 sec.	0.30 sec.	0.50 sec.



Model MA6501

PRECISION REGULATED TUBELESS DC SOURCE

A transistorized precision regulated DC source utilizing magnetic amplifier principles. This highly-stable, temperature-compensated unit is Sorensen's new design for use with the Beckman Model DU Spectrophotometer.

ELECTRICAL CHARACTERISTICS

Input	105-125 VAC, 1ϕ, 60 cycle.
Output	#1 — 6 VDC adjustable internally $\pm$5%, 5 amperes load. #2 — 6 VDC, 100 milliamperes load. #3—2 VDC, 30-60 milliamperes
Reg. accuracy	$\pm$0.01% against line $\pm$0.1% against load
Ripple	30 mv RMS max. on #1 and #2 10 mv RMS max. on #3
Stability	Typical stability after a 30 minute warm-up is .01% for an eight hour period.

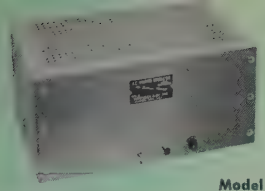
Model MR3215

MAGNETIC RANGERS

Rugged tubeless DC power supplies requiring negligible maintenance, Magnetic Rangers provide wide range, continuously adjustable, well-regulated voltage at high current. One versatile instrument can satisfy a wide variety of your DC needs.

ELECTRICAL CHARACTERISTICS

Input	105-125 VAC, 1ϕ, 50-60 cycles
Output voltage	5-36 VDC, continuously adjustable
Output current	MR3215: 0-15 amps MR3230: 0-30 amps
Reg. accuracy	$\pm$0.5% against line $\pm$0.5% against load
Ripple	1% RMS at 36 volts
Recovery time	0.2 sec.



Model 1000S

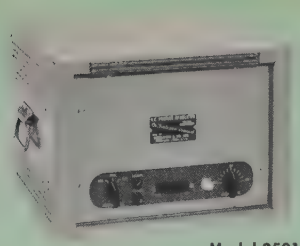
AC REGULATORS *(electronic).*

Utilizing the original Sorensen circuit and incorporating the *Safety Diode*, these regulators are noted for accuracy, economy of operation, easy maintenance. Models available with capacities from 150VA to 15KVA, single phase.

Models available (Numbers denote VA capacities) 150S, 250S, 500S (-2S also), 1000S (-2S also), 2000S, 3000S (-2S also), 5000S (-2S also), 10000S (-2S also), 15000S (-2S also).

ELECTRICAL CHARACTERISTICS

Input	95-130 VAC, 1ϕ, 50 or 60 cycles $\pm$10%. 190-260 VAC in "-2S" models.
Output	115 VAC adj. 110-120; 230 VAC with "-2S" models.
Reg. accuracy	$\pm$0.1% against line, $\pm$0.1% against load.
P.F. range	Unity to 0.7 lagging.
Distortion	Varies to 3% max. under worst conditions.
Load range	0 to full load.



Model 2501

PRECISION AC REGULATORS

(electronic).

Giving ultra-precise, $\pm$0.01% regulation, these instruments are rugged and serviceable, as proved by hundreds of applications in the field. Models available with capacities of 1000VA and 2500VA.

ELECTRICAL CHARACTERISTICS

Input	95-130 VAC, 1ϕ, 50 and 60 cycles.
Output	115 VAC, 1ϕ, adj. 110-120.
Reg. accuracy	$\pm$0.01% against line, $\pm$0.01% against load.
Distortion	3% maximum.
P.F. range	Unity to 0.7 lagging.
Load range	0 to full load.

Model APR 1010

TUBELESS MULTI-PURPOSE AC LINE REGULATOR

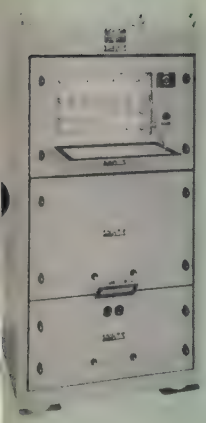
(Average, peak, or RMS regulation)

First regulator of its kind. Designed to regulate average, peak, or RMS value as selected. May also be used as DC controller. Saves space, eliminates instrument duplication, means greater economy. Five principal sensing arrangements: Internal, external, remote, constant current, DC.

ELECTRICAL CHARACTERISTICS

Input	95-130 VAC, 1ϕ (50 or 60 cps $\pm$10%)
Output	115 VAC, adj. 110-120 v.
Reg. accuracy *(RMS, average, or peak, switch selected)*	$\pm$0.1% against line $\pm$0.1% against load
Distortion	3% max.
Load	0-1000 VA
P.F. range	Unity to 0.7 lagging
Recovery time	0.1 sec.

SPECIAL EQUIPMENT



Typical militarized power supply

Sorensen also manufactures a wide range of special equipment including computer power supplies and militarized units. For unusual climatic conditions, many standard and special designs are available with "Fosterited" or potted wound components.

MILITARIZED UNITS

Over the years, many versions of standard Sorensen products have been designed for military applications. While there is no all-encompassing military specification for voltage regulators, Sorensen can provide equipment with MIL-preferred components throughout, designed to meet MIL-T-27A for wound components and in accordance with MIL-E-4158A or MIL-E-16400A. Typically, the newest militarized units to be featured as standard catalog items are the 500MIL and the soon-to-be-released 1500MIL. These are rugged 500 and 1500 VA militarized regulators conforming as above, and offering 1% total regulation accuracy against line, load, and frequency changes, with an ambient temperature range of —40° C to +55° C.

COMPUTER POWER SUPPLIES

In the design of standard and special equipment, Sorensen is outstanding in its application of alternate engineering approaches to the specific customer requirement. Rather than concentrate on any one particular design—electronic, tubeless magnetic amplifier, magnetic voltage regulator, etc.—Sorensen can draw on all types without prejudice or limitation.

In the area of computer power supplies, for instance, broad experience has been gained in the design and production of regulated and semi-regulated supplies using each of these approaches, singly or in combination.

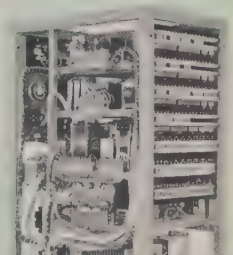
Let Sorensen apply its experience to your computer supply problems. We can provide a complete solution through our separate facilities, engineering, and production personnel specifically devoted to the design and volume production of computer power supplies.

AIRBORNE ELECTRONIC FREQUENCY CHANGERS AND INVERTERS

Sorensen has designed and built a wide variety of frequency changers and inverters for incorporation in military aircraft. For the most part, the changers convert variable (3200-1000—) input power to precision ($\pm$0.05%) output frequency. Most models are also voltage regulated ($\pm$1%) with minimum distortion (5-10%).

Airborne inverters are built to convert 28 VDC input to 400-cycle, 3-phase output, with output frequency accurate to 0.05% over wide ambients.

Sorensen's wide experience with commercial and military frequency changers may well supply the answer to your precision frequency problems. Our complete line of standard frequency changers is outlined on the next page.



Typical multi-voltage computer power supply

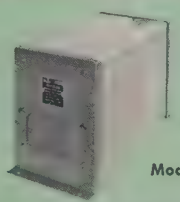
Model VRS-AC751

AC VOLTAGE REFERENCE SOURCE

Provides highly stable AC voltage for many laboratory and industrial uses such as direct calibration of voltmeters and oscilloscopes, servo testing, amplifier gain checks. Compact, large power capacity, precisely regulated, finely calibrated.

ELECTRICAL CHARACTERISTICS

Input	105-125 VAC, 1ϕ, 60 $\pm$0.5 cps
Output	0.1 to 799.9 VAC in 0.1-volt steps
Load	240 VA
Output voltage accuracy	$\pm$0.25% (Much greater accuracy possible through correction curves)
Generated distortion	1% maximum



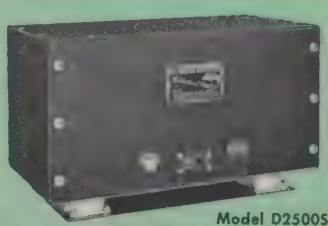
Model MVR1000

MVR's (magnetic voltage regulators)

These low-cost magnetic voltage regulators are tubeless, give utmost reliability with good regulation. Very compact, they are ideally suited for incorporation as components. Available in capacities of 15, 30, 60, 120, 250, 500, 1000, and 2000 VA (designated MVR15, MVR30, etc.). Also available with 6.3 volt isolated output in 30, 60, and 160 VA capacity, (—6 models).

For low-distortion requirements up to 120 VA, specify harmonic-filtered MVRH120 (less than 3% distortion). 12.6 volt MVR's and a more complete extension of 6.3 volt and harmonic-filtered lines will be available shortly.

Input	95-130 VAC, 1ϕ, 60 cycles.
Output	115 VAC nominal (except 6.3 volt filament regulators)
Reg. accuracy	$\pm$0.5% against line.
Load range	0 to full load.



Model D2500SAN

400-CYCLE AC REGULATORS

Designed especially for airborne and ground testing installations for aircraft, missiles, gyros and related 400-cycle applications. Military type components and construction; all wound components are Fosterited. Available in models D250SAN, D500SAN, D1200SAN, D2500SAN (numbers 250, etc. denote VA capacities).

ELECTRICAL CHARACTERISTICS

Input	95-130 VAC, 1ϕ, 400 cycles $\pm$10%.
Output	115 VAC, 1ϕ, adj. 110-120.
Reg. accuracy	$\pm$0.25% against line, $\pm$0.25% against load
Distortion	5% maximum.
P.F. range	Unity to 0.7 lagging.
Load range	0 to full load.

CONTROLLED POWER FOR RESEARCH AND INDUSTRY

FREQUENCY FLEXIBILITY

Sorensen electronic frequency changers convert 50 or 60 cycle line to well-regulated AC output at 60 cycles, 400 cycles, or a wide range of output frequencies. These convenient, portable sources have found general application in aviation, missile, automatic control and related fields.

1000VA FREQUENCY CHANGERS

Model FC 1000 (45-65 cps out.)
Model FCD 1000 (360-440 cps out.)

ELECTRICAL CHARACTERISTICS

Input	208 or 230 VAC ±10% 1ø, 50 or 60 cycles
Output voltage	115 VAC, adj. 105-125V
Voltage regulation	±1%
Output frequency	(FCD 1000) 360-440 cps (FC 1000) 45-65 cps
Regulation accuracy	±1% (±0.01% with auxiliary frequency standard fixed at 50, 60 or 400 cps.)
Load range	0-1000 VA

Model FCD1000

WIDE RANGE FREQUENCY CHANGERS

Model FCR250

Latest, most versatile additions to the Sorensen line of regulated electronic frequency changers. Operating from 50 or 60 cycle line, these voltage- and frequency-regulated units permit simple dial selection of any frequency within a wide output range. Portable and practical, these instruments offer unique solutions to a wide variety of your laboratory, test, or production requirements.

	FCR100	FCR250
Input	105-125VAC, 1 phase, 45-65 cps	105-125VAC, 1 phase, 48-65 cps
Output voltage	115VAC, adj. 0-130V (specs below for 105-125V)	115VAC, adj. 105-125V
Output frequency		
Range 1	45-300 cps	320-570 cps
Range 2	300-2000 cps	560-1000 cps
Voltage Regulation	±1% for line ±1% for load	±1% for all variations
Frequency Regulation	±1% (provision for ext. freq. standard of greater precision.)	±1% (±0.01% with aux. freq. standard fixed at 400 cycles.)
Load range	0-100 VA	0-250 VA (up to 500 watts with improved reg. at 400 and 800 cps)

CONTACT THESE LOCAL REPRESENTATIVES

Whatever your power control requirements—for industry, military applications or research—you will find a unit which meets your *exact* specifications in Sorensen's wide variety of instruments, coupled with the extensive line of high-voltage equipment produced by the Beta Electric Division. In addition to their many standard products, both Sorensen and Beta have unusual experience in the engineering and production of special equipment to meet unique requirements. The authorized local representatives listed below are at your service; call the one nearest you for advice on Sorensen or Beta equipment.

CALIFORNIA—Palo Alto
McCarthy Associates
441 W. California Ave.
Phone Davenport 5-6136

CALIFORNIA—Pasadena
McCarthy Associates*
1055 E. Walnut
Phone Sycamore 2-8272

CALIFORNIA—San Diego 1
McCarthy Associates
934 West Laurel St.
Phone Belmont 9-4015

COLORADO—Denver 10
Lahana & Company
1886 South Broadway
Phone Pearl 3-3791 TWX DN676

CONNECTICUT—Bridgeport
Yewell Associates, Inc.
1101 East Main Street
Phone Forest 6-3456

D. C.—Washington 9
Horman Associates, Inc.*
2017 S. Street, N.W.
Phone Decatur 2-5705 TWX WA559U

FLORIDA—Fort Myers
Arthur H. Lynch & Assoc.
35 West North Shore Ave.
P. O. Box 466
Phone Edison 4-4431

GEORGIA—Atlanta 5
Bivins & Caldwell, Inc.*
3133 Maple Drive, N.E.
Phone Cedar 3-7522 TWX 987U

ILLINOIS—Chicago 45
Pivan Engineering Co.*
2820 Peterson Ave.
Phone Briargate 4-9135

MARYLAND—Baltimore
Horman Associates, Inc.*
635 St. Johns Road
Phone Hopkins 7-2290

MASSACHUSETTS—Burlington
Yewell Associates, Inc.*
Middlesex Turnpike
Phone Burlington 7-2561

MICHIGAN—Detroit 35
S. Sterling Company*
15310 W. McNichols Road
Phone Broadway 3-2900

MINNESOTA—Minneapolis 3
Pinkney & Hine
1925 Nicollet Ave.
Phone Federal 8-0523 TWX, Minn. Code FMR

MISSOURI—Kansas City 30
Harris-Hanson Co.
7916 Paseo Avenue
Phone Hiland 6744 TWX KC448

MISSOURI—St. Louis 17
Harris-Hanson Co.
2814 So. Brentwood Blvd.
Phone Mission 7-4350 TWX WEB237

NEW JERSEY—Asbury Park
The I. E. Robinson Co. (branch)
905 Main St.
Phone Kellog 1-3150

NEW JERSEY—Bogota
RMC Associates, Inc. (branch)
114 E. Main St.
Phone Diamond 3-5926

NEW YORK—New York
RMC Associates, Inc.*
236 E. 75th Street
Phone Trafalgar 9-2023 TWX NY 1-3805

NEW YORK—Rochester 18
J. D. Ryerson Associates, Inc.
105 Pickwick Drive
Phone Greenfield 3-3706

NEW YORK—Syracuse 2
J. D. Ryerson Associates, Inc.*
412 E. Genesee Street
Phone 76-8344 TWX SS-312

NORTH CAROLINA—Charlotte
James L. Highsmith Co.
P. O. Box 1011
Phone Franklin 5-6436

OHIO—Cleveland 21
S. Sterling Company (branch)
4311 Mayfield Road
Phone Evergreen 2-4114

OHIO—Dayton 2
S. Sterling Company (branch)
379 West 1st Street
Phone Fulton 8794

OREGON—Portland 16
James L. Kearns Company†
P. O. Box 5108
Phone Belmont 6-2444

PENNSYLVANIA—Camp Hill
The I. E. Robinson Co. (branch)
2120 Market Street
Phone Regent 7-6791

PENNSYLVANIA—Pittsburgh 36
H. E. Ransford Co.
5400 Clairton Blvd.
Phone Tuxedo 4-3425

PENNSYLVANIA—Upper Darby
The I. E. Robinson Company*
7404 West Chester Pike
Phone Flanders 2-7017 TWX Flanders 533

TEXAS—Dallas 9
Earl Lipscomb Associates*
P. O. Box 7084
Phone Fleetwood 8-1771 Teletype DL-411

TEXAS—Houston 5
Earl Lipscomb Associates (branch)
P. O. Box 6573
Phone Jackson 4-9303

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Hawthorne Electronics††
107 Administration Bldg.
Boeing Field
Phone Mohawk 3962

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James L. Kearns Company†
Phone Mutual 4566
Mail: Portland Office

HAWAII—Honolulu 17
Gene Piety
2030 Home Rule Street
Phone 83105

CANADA—Ajax, Ontario
Bayly Engineering, Limited*
1st Street
Phones: Toronto Empire 8-6866, Ajax 118

CANADA—Vancouver 2, B. C.
Arva
229 Rogers Bldg.
Phone Pacific 3367

MEXICO—Mexico City
Electro Labs. S.A.
Guanajuato #121
Phone 11-60-94

**Complete service facilities maintained for rapid local servicing of Sorensen and Beta equipment.*
†Sorensen line only.
††Beta line only.

WRITE FOR LITERATURE

Send for complete information, including specifications, performance data and quotations. Product data sheets are issued on all new units as they become available. Inquiries regarding special applications and specifications are invited. Address Sales Engineering Department, Sorensen & Co., Inc., Richards Ave., South Norwalk, Conn., or (for high voltage applications) write Beta Electric Division, 333 East 103rd Street, New York 29, New York; or contact the local representative shown above. In Europe, please contact directly Sorensen-Ardag, Eichstrasse 29, Zurich 3, Switzerland.

West Coast Field Office: 1055 East Walnut St., Pasadena, Calif.

Sorensen

SORENSEN & CO., INC. • RICHARDS AVE., SOUTH NORWALK, CONN.
PHONE: TEMPLE 8-6571

Printed in U. S. A.

SERIES 1000 RACK-MOUNTED HIGH VOLTAGE DC POWER SUPPLIES

0-1 to 0-50 KV, 2-500 ma

FEATURES:

- **Rugged construction**
- **Conservative design**
- **Fully self-protected**
- **Minimum operational hazards**

SPECIFICATIONS:

REGULATION—Unregulated, but full rated current is available at maximum voltage. Regulation at maximum output voltage varies 15-50%.

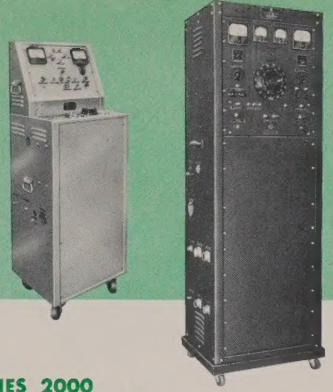
RIPPLE—At maximum rated voltage and current in any voltage range, ripple is below 2.5% rms for the maximum current in that range.

SELENIUM RECTIFIERS—Employed in most designs with current ratings below 10 milliamperes.

POLARITY—Reversible standard, center-tapped on special order.

METERS—3½" output voltage and current meters, ±3% full-scale accuracy on all ranges.

VOLTAGE & CURRENT RANGE—0-1 KV, 500 ma; 0-3 KV, 200 ma; 0-5 KV, 10 ma; 0-5 KV, 50 ma; 0-5 KV, 100 ma; 0-10 KV, 2 ma; 0-10 KV, 10 ma; 0-10 KV, 50 ma; 0-15 KV, 2 ma; 0-15 KV, 5 ma; 0-15 KV, 10 ma; 0-30 KV, 2 ma; 0-30 KV, 5 ma; 0-30 KV, 10 ma; 0-50 KV, 2 ma; 0-50 KV, 5 ma.



SERIES 2000 AIR AND OIL INSULATED HIGH VOLTAGE DC POWER SUPPLIES

0-1 to 0-250 KV, 5-3000 ma

FEATURES:

- **Two-unit construction for remote operation**
- **Maximum personnel and equipment protection**
- **Conservatively rated**
- **Simple to operate**

SPECIFICATIONS:

POLARITY: Reversible by interchanging links in the high voltage section.

REGULATION: Unregulated. However, *full-rated voltage and current* are obtainable from all units.

OUTPUT VOLTAGE & CURRENT: 0-1000 V, 3000 ma; 0-3000 V, 1000 ma; 0-5000 V, 400 ma; 0-10KV, 200 ma; 0-20 KV, 150 ma; 0-30 KV, 30 ma; 0-50 KV, 10 ma; 0-50 KV, 50 ma; 0-100 KV, 5 ma; 0-120 KV, 5 ma; 0-150 KV, 5 ma; 0-250 KV, 10 ma; 0-250 KV, 5 ma (Cockroft-Walton).

In addition to standard models in this Series, BETA offers more elaborate versions for research, development and similar exacting work.

SERIES 3000 DC OVERPOTENTIAL TESTERS

0-30 to 0-150 KV, 1-5 ma

FEATURES:

- **Minimum size and weight**
- **Non-destructive, qualitative and quantitative dielectric testing**
- **"Burn" currents available for positive fault identification**
- **Effective personnel and equipment protection**

SPECIFICATIONS FOR ALL MODELS

INPUT VOLTAGE — 105-125 volts, 50-60 cycles, single phase.

OUTPUT VOLTAGE — Continuously variable from zero to maximum rated voltage, adjustable to 0.03% of maximum rating. 30KV, 5ma; 50KV, 5ma; 80KV, 2ma; 120KV, 1ma; 80KV, 5ma; 120KV, 5ma; 150KV, 5ma.

OUTPUT CURRENT — Maximum rated current can be drawn continuously at maximum voltage.

POLARITY—Reversible.

SERIES PKV PEAK-READING KILOVOLTMETERS

0-20 to 0-50 KV

FEATURES:

- **High accuracy and sensitivity**
- **High stability—dependable long-term readings**
- **Narrow pulsewidth measurement—as low as 1 μsec**
- **Optional despiking—eliminates wave overshoots**

SPECIFICATIONS:

DUTY CYCLE RANGE—From DC (1.0) to as low as 0.00025.

REPETITION RATE RESPONSE—Charging time constant of less than 1 μsec and discharge constant of approximately 1 second, for repetition rates between 5 cps and all radio frequencies.

ACCURACY — ±1% or ±3% (optional), with 100 μa DC full-scale sensitivity.

INPUT IMPEDANCE — Approximately 8 mmf with high voltage positive, 38 mmf with high voltage negative.

POLARITY — Reversible via internal lead interchange.

VOLTAGE RANGES—0-20 KV, 30 KV and 50 KV.

SERIES KV PORTABLE & SEMI-PORTABLE, SINGLE & DUAL RANGE KILOVOLTMETERS

0-15 to 0-200 KV

FEATURES:

- **Linear scales**
- **Stabilized multipliers**
- **Ample overload factor**
- **Compact, Convenient, Rugged**

LOW-DRAIN PORTABLE KILOVOLTMETERS 0-15 to 0-50 KV

VOLTAGE RANGES — 0-15, 0-30, 0-50, 0-15/30, 0-25/30 KV.

SENSITIVITY—25,000-50,000 ohms/volt.

ACCURACY—±1% or ±3% full-scale (optional).

LOW-DRAIN SEMI-PORTABLE KILOVOLTMETERS 0-100 to 0-200 KV

VOLTAGE RANGES—0-100, 0-150, 0-200 KV.

SENSITIVITY—10,000 and 20,000 ohms/volt.

ACCURACY—±3% full-scale, ±1% ⅔-scale.

BETA

first in high voltage

Beta Electric has, for more than 10 years, specialized in the research, design, development and production of DC and AC high voltage equipment. The unique experience gained through these years of custom manufacture of compact, reliable equipment for specialized applications has resulted in efficient standardization of design, with the retention of flexibility and versatility inherent in custom design.

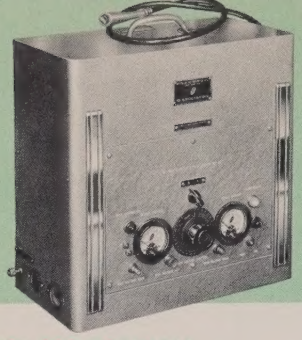
WRITE Sales Engineering Dept. for individual product data sheets, or for consultation on special requirements.

BETA ELECTRIC

Division of Sorensen & Co., Inc.

333 EAST 103RD STREET

NEW YORK 29, NEW YORK



SERIES 200 PORTABLE HIGH VOLTAGE DC POWER SUPPLIES

0-30 KV, 2 & 5 ma

FEATURES:

- Lightweight and Portable
- Air Insulation
- Reversible Polarity
- Safe and Reliable

SPECIFICATIONS:

OUTPUT VOLTAGE—0-30,000 volts DC, continuously variable.

OUTPUT CURRENT—2.0 ma at 30 KV, 3 ma below 28 KV (Model 230-2); 5ma at 30 KV, 7 ma below 24 KV (Model 230-5).

HIGH VOLTAGE POLARITY — Reversible

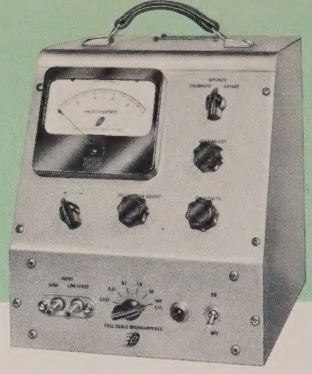
RIPPLE—Approximately 1.0% per ma at 30 KV.

OUTPUT CAPACITANCE—0.005 mf in series with 0.5 megohm, plus output lead capacitance (app. 150 mmf).

REGULATION—Internal resistance 2.5 megohms.

METERS—KV meter 0-30 KV DC, ±2.5% initial accuracy. Ammeter 0-1 amp AC, ±3% initial accuracy (Model 230-2), Load current meter 0-10 ma DC (Model 230-5).

In addition to standard models in this Series, BETA offers more elaborate versions for research, development and similar exacting work.



MODEL 301-A ELECTRONIC MICROAMMETER

FEATURES:

- Highly sensitive
- Rugged; impervious to overloads
- No moving parts
- Self-calibrating

SPECIFICATIONS:

POWER—95-125 volts, 50-60 cycle AC, 60 VA.

RANGES — 0.001/0.01/0.1/1.0/10/100 μa, full scale.

ACCURACY—5% full scale on 0.001 range. 3% on all other ranges.

INPUT VOLTAGE SENSITIVITY—40 millivolts DC full scale; constant for all ranges.

METER—4"-square bakelite case, 50 dial graduations, 1.0 μa full scale.

SERIES 800 PORTABLE AC HIPOT TESTERS

0-2 KV to 0-20 KV, 1-5 ma

FEATURES:

- Automatically-limited maximum short circuit current
- High-speed overload cutoff relay
- Direct indication of insulation breakdown
- Direct reading kilovoltmeter across output

SPECIFICATIONS:

WAVEFORM DISTORTION — Less than 5% sine wave at no load.

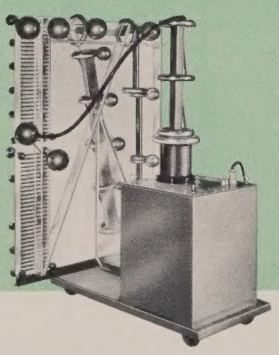
METER—4" square bakelite-cased, ±5% full scale accuracy.

HV CONTROL—On-Off pushbutton.

OUTPUT VOLTAGE & CURRENT — 0-2 KV, 1 ma; 0-5 KV, 2 ma; 0-10 KV, 3 ma; 0-15 KV, 4 ma; 0-20 KV, 5 ma.

BETA HIGH VOLTAGE EQUIPMENT

See preceding page for local representatives.



SERIES 4000 AIR-INSULATED, SELENIUM-RECTIFIED HIGH VOLTAGE POWER SUPPLIES

250 KV, 2 ma

FEATURES:

- Lightweight, easily maneuverable
- Components unusually accessible for servicing
- Low corona
- Extremely long operational life

SPECIFICATIONS:

INPUT VOLTAGE — 105-125 volts, 50-60 cycles, single phase.

INPUT VOLTAMPERES—Approximately twice rated maximum output power.

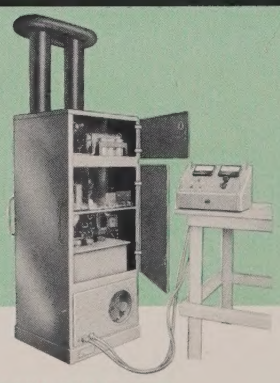
OUTPUT VOLTAGE — Continuously variable from zero to 250 KV.

OUTPUT CURRENT—2 ma can be drawn continuously at maximum voltage.

POLARITY—Reversible via manual positioning of rectifier ladders.

REGULATION—Unregulated, with internal impedance of 11 megohms; However, full-rated voltage and current are obtainable.

In addition to standard models in this Series, BETA offers more elaborate versions for research, development and similar exacting work.



SERIES 6000 REGULATED HIGH VOLTAGE DC POWER SUPPLIES

FEATURES:

- Electrostatic generator
- Electronic voltage regulation and stabilization
- Unusually compact and lightweight
- Low-short-circuit current

SPECIFICATIONS:

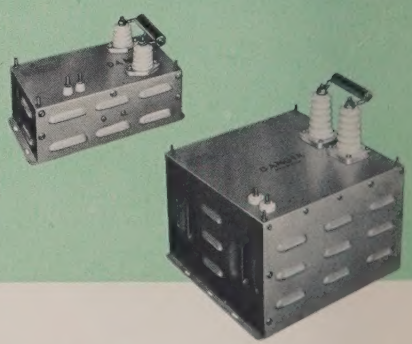
POWER INPUT—220 volts, 50-60 cycle, 3 phase.

OUTPUT VOLTAGE — 50-150 KV and 5-150 KV (cont. var.)

OUTPUT CURRENT—2.4 ma maximum.

REGULATION—±2% (load) ±4% (line) or ±0.2% (load) ±0.1% (line)

POLARITY—Negative (standard)



SERIES 9000 "HI-SEL" DC POWER PACKS

5-15 KV, 2.5 & 5 ma

FEATURES:

- Air-insulated
- Selenium rectifiers
- Low ripple in all current ratings
- Good dynamic load regulation

SPECIFICATIONS:

OUTPUT VOLTAGE (KV)	OUTPUT CURRENT (ma)	DIMENSIONS	WEIGHT (lbs.)	RIPPLE (rms)
0-5	5	7¾h" x 4¼"w x 3"d	6	1.5%
0-10	2.5	8"h x 6"w x 5"d	10½	1.0%
0-10	5	8"h x 6"w x 5"d	10½	2.0%
0-15	2.5	9"h x 8½"w x 6"d	13	0.5%
0-15	5	9"h x 8½"w x 6"d	13	1.0%

Models with ratings up to 30 KV available shortly.

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